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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/632,148	07/31/2003	Elisabeth Borredon	454.002	1867

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MUSERLIAN, LUCAS AND MERCANTI, LLP
475 PARK AVENUE SOUTH
15TH FLOOR
NEW YORK, NY 10016

EXAMINER

TUCKER, ZACHARY C

ART UNIT	PAPER NUMBER
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1624

DATE MAILED: 02/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/632,148	Applicant(s) BORREDON ET AL.	
	Examiner Zachary C. Tucker	Art Unit 1624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 9 is/are rejected.
- 7) ☒ Claim(s) 8 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>31Jul03</u> . | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is not clear whether the products made by the process of instant claim 3, "benzene derivatives," are phenyl-substituted derivatives of azoles, indoline, pyrazolidine, morpholine, piperazine and azepine, or if the products are the benzo-fused derivatives thereof. The products specified in claim 3 cannot be both, unless this is specifically recited in the claim.

Claim 3 has been searched with either interpretation in mind, in the interest of compact prosecution.

Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The word "gradually" when present as a claim limitation, renders the scope of protection sought indefinite. Terms like "quickly" or "slowly," of which "gradually" is the same ilk, do not have any exact meaning recognized by one of ordinary skill. That one of ordinary skill in the art might be able to distinguish *some* of what is within the meaning of "gradually" from *some* of what is not within the meaning of the word does

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not prove that "gradually," when present as a claim limitation in a process, renders the full scope of that claim clear and well-defined. Art has been applied to claim 6 because in any continuous process, as is specified in claim 1, reactants are *necessarily* added gradually.

Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 7 specifies a "flow rate" but the value given for the "rate" does not include a time dimension. Therefore, no flow rate is actually specified by the claim's language. What is specified in claim 7 is a flow ratio, or more appropriately, a feed ratio. Claim 7 has been examined with "flow ratio" in mind rather than "flow rate," since no time dimension is included in the range given.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 4-7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,453,516 (Fischer et al) in view of Smith and Linnhoff, "The Design of Separators in the Context of Overall Processes" Chemical Engineering Research and Design, vol. 66, pages 195-228 (May 1988).

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At the time the invention was made, the process according to claims 1, 2, 4-7 and 9 would have been obvious to one of ordinary skill in the art given the teaching of Fischer et al and Smith and Linnhoff.

Fischer et al teaches a process for methylation of heterocycles, preferably butyrolactones and pyrrolidones.

Example 6 of Fischer et al demonstrates the methylation of N-methylpyrrolidone with dimethyl carbonate as the methylating agent. This example is carried out in batch fashion.

Fischer et al teaches in column 2, lines 10-14 that the process is preferably carried out within a temperature range of 150-230°C, and 0.5-5.0 bar (which is equal to 50,000-5,000,000 Pa), both of which are squarely within the ranges specified in instant claim 1.

The temperature limitation in instant claim 4 is met by Fischer et al's teaching in column 2, lines 10-14 as well.

Instant claims 5-7 relate to the manner in which reactants are combined. Since Fischer et al's process has a 1:1 stoichiometry, one of ordinary skill would find it *prima facie* obvious to combine the reactants employed in Fischer et al in a 1:1 ratio. A 1:1 ratio is within the range specified in claims 5 and 7.

In any continuous process, it is obvious that, since the process is continuous, the reactants are not combined all at once. Thus, they are combined "gradually" in the broadest reasonable interpretation of the term.

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Column 2, lines 15 and 16 of Fischer et al state that the process may be carried out batch or continuously.

Example 6 of Fischer et al makes a dimethylated product starting from N-methylpyrrolidone. N-methylpyrrolidone has a boiling point of 202°C, so the methylated product would be expected to have a higher boiling point, since its MW is higher. Thus, the limitation posed in instant claim 2 is met.

The deficiency of Fischer et al is therefore, that a continuous embodiment of the process is not actually carried out and reported in the patent. A continuous embodiment, however, is expressly suggested.

One of ordinary skill understands that in a continuously operated chemical process, continuous feed of the reactants, and continuous removal of products of the reaction, which includes by-products, is necessary. To do otherwise would render the process other than a continuous one.

One of ordinary skill in the art understands that a by-product of the reaction disclosed in Fischer et al is methanol. Continuous removal of this methanol is necessary in the continuous embodiment expressly suggested by Fischer et al.

Smith and Linnhoff, "The Design of Separators in the Context of Overall Processes" Chemical Engineering Research and Design, vol. 66, pages 195-228 (May 1988) teaches general considerations in the design of chemical processes. Pages 196 and 197 include some flow diagrams of typical continuous chemical processes. A product stream of mixed dimethylated product and methanol, along with other

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components would be withdrawn from the reactor in Fischer et al's continuous embodiment.

The motivation for one of ordinary skill in the art to carry out Fischer et al's methylation process in a continuous manner would have been to produce dimethylpyrrolidone on a large scale for solvent production or fine chemical production.

Allowable Subject Matter

Claim 3 would be allowable if rewritten to overcome the rejection under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Claim 3, although indefinite, is not suggested in Fischer et al. Whether claim 3 is intended to be drawn to phenyl substituted heterocycles selected from azoles, indoline, pyrazolidine, morpholine, piperazine and azepine, or claim 3 is drawn to the benzo-fused derivatives thereof, such a process is not within the teaching of Fischer et al's continuous methylation process.

Claim 8 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Fischer et al does not suggest any nitrogen containing heterocycles as are embraced by the language of instant claim 8. Only heterocycles which contain one nitrogen atom are within the teaching of Fischer et al's continuous methylation process.

Close prior art includes US 5,164,497 (King et al). The process in the King et al patent is primarily concerned with decarboxylation of various chemicals. Some

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examples, notably Example 53, teach batch alkylation of heterocyclic compounds.

Example 53 discloses synthesis of mono- and dimethylpiperazine from piperazine and dimethyl carbonate. No express suggestion to make the process of Example 53 continuous is found in King et al, and the temperature in Example 53 is higher than the range specified in instant claim 1. No pressure is disclosed in this example either, rendering the specific range in instant claim 1 unobvious over King et al as well.

Conclusion

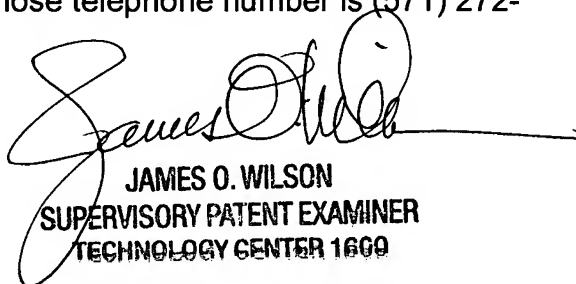
Any inquiry concerning this communication should be directed to Zachary Tucker whose telephone number is (571) 272-0677. The examiner can normally be reached Tuesday-Thursday from 6:15am to 2:45pm, Monday from 6:15am to 1:45pm and Friday from 6:15am to 3:45pm (EST). If Attempts to reach the examiner are unsuccessful, the examiner's supervisor, Mukund Shah, can be reached at (571) 272-0674.

If, after a 24-hour period, Dr. Shah is unreachable, contact the examiner's acting supervisor, James O. Wilson, at (571) 272-0661.

The fax number for the organization where this application or proceeding is assigned is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-1600.

zt



JAMES O. WILSON
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1600